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Substituting r' and p' from (1) and (2) in (4),

$$h=\frac{2ap^3}{r^2}\text{.........}(5).$$

Then (5) in (3), gives

$$kr^4dr=4a^2p^2dp\text{........}(6),$$

the differential equation to the required orbit.

Integrating (6), and supposing r and p to vanish together,

$$\frac{k}{5}r^5=a^2p^4\text{.........}(7),$$

the required orbit.

II. Solution by **G. W. GREENWOOD, M. A.**, Professor of Mathematics, McKendree College, Lebanon, Ill.

Let the equation to the hodograph be $r=2a\cos^2\frac{1}{2}\theta$. Since the acceleration in the original curve is constant the velocity of the point in the hodograph is constant, and $s=4akt$, where k is some constant; that is $kt=\sin\frac{1}{2}\theta$.

From the equation to the hodograph we have $v=2a\cos^2\frac{1}{2}\psi$, where v is the velocity in the orbit and ψ is the inclination of the tangent at that point to the initial line.

$$\therefore\ \frac{ds}{dt}=2a\cos^2\tfrac{1}{2}\psi=2a(1-k^2t^2).$$

$$\therefore s=2a(t-\tfrac{1}{3}k^2t^3);\ i.\ e.,\ s=\frac{2a}{k}(\sin\tfrac{1}{2}\psi-\tfrac{1}{3}\sin^3\tfrac{1}{2}\psi),$$

which is the intrinsic equation to the orbit.

Also solved by G. B. M. Zerr, S. A. Corey, and the Proposer.

PROBLEMS FOR SOLUTION.

ALGEBRA.

234. Proposed by **G. W. GREENWOOD, M. A. (Oxon)**, Professor of Mathematics and Astronomy, McKendree College, Lebanon, Ill.

Prove that $(x+n)^n-n(x+n-1)^n+\frac{n(n-1)}{2!}(x+n-2)^n-+\text{.........}=n!$

235. Proposed by **WILLIAM HOOVER, Ph. D.**, Athens, Ohio.

Easter Sunday, 1905, was on April 23. How often in the last one hundred years has this occurred, and when?

236. Proposed by **L. SHIVELY**, Mt. Morris College, Mt. Morris, Ill.

Sum to infinity the series $\frac{n^2}{(n+1)\,!}$ beginning with $n=1$.

GEOMETRY.

257. Proposed by **G. I. HOPKINS**, A. M., Manchester, N. H.

Construire un triangle équilatéral sachant qu'el doit s'appuyer par ses trois sommets sur trois circonférences concentriques données. *Rouché et Comberousse.*

258. Proposed by **B. F. FINKEL**, A. M., Professor of Mathematics, Drury College, Springfield, Mo.

Prove that the tangents to an ellipse from any external point subtend equal angles at the focus, by means of the formula $\tan\phi=(m_1-m_2)/(1+m_1m_2)$, where ϕ is the angle between the focal radius of either of the points of tangency and the line joining the focus and the external point, and m_1 and m_2 are the slopes of these two lines.

259. Proposed by **R. D. CARMICHAEL**, Hartselle, Ala.

Given three non-intersecting circles; to draw eight tangent circles, each tangent to all three of the given circles.

CALCULUS.

196. Proposed by **F. P. MATZ**, Sc. D., Ph. D., Reading, Pa.

The shortest tangent intercepted by the axes of the ellipse to which the tangent is drawn, equals the sum of the semi-axes of the ellipse.

197. Proposed by **R. D. CARMICHAEL**, Hartselle, Ala.

$$\int_0^\infty \frac{\sin mx\ \cos nx}{x}dx.$$

189. Proposed by **M. E. GRABER**, A. M., Heidelburg University, Tiffin, O.

Show that $e\int_1^\infty,\ \varepsilon^2\int_2^\infty, \ldots\ldots \varepsilon^n\int_n^\infty, \ldots\ldots$ are integers divisible by $(p+1)\,!$, when the expression under the integral is $Z^p\Big[(z-1)\ldots\ldots\ (z-n)\Big]^{p+1}e^{-z}\,dZ$.

MECHANICS.

178. Proposed by **F. ANDEREGG**, A. M., Professor of Mathematics, Oberlin College. Oberlin, O.

A weight W is drawn up a rough conical hill of height h and slope α. and